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VARIATION OF SOLAR WIND INTENSITY WITH THE PHASE OF THE SOLAR ACTIVITY CYCLE ACCORDING TO DATA OF STEADY GEOMAGNETIC FIELD OSCILLATIONS

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SUMMARY

It is shown in this work that the mean amplitude of short-period oscillations of the Earth's magnetic field of the type pc4, corresponding to the solar wind from unperturbed regions of the Sun (Kp = 0), remained constant during the period from 1957 through 1964. Hence the conclusion is derived that, according to [1], the intensity of the solar wind originating from the unperturbed regions of the Sun does not vary with the phase of solar acticity cycle.

* * *

It was shown in the work by M. S. Bobrov et al [1] that the properties of the solar wind are investigated on the basis of study of permanent variations in polar caps (P_o- disturbances) during days with a very low planetary magnetic activity. One of the results of the work [1] is the conclusion that the solar wind is continually generated by the quiet Sun regions, and that the emissive capability of those regions does not depend on the level of solar activity.

It appears to be quite important to investigate this question on the basis of quite independent data on short-period oscillations of the Earth's electromagnetic field. It is well known from short-period oscillations' morphology that there exists a dependence of the period of steady

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* IZMENENIYE INTENSIVNOSTI SOLNECHNOGO VETRA S FAZOY TSIKLA SOLNECHNOY ATIVNOSTI PO DANNYM USTOYCHIVYKH KOLEBANIY GEOMAGNITNOGO POLYA.

oscillations of the geomagnetic field on the level of magnetic activity, so that to each level of activity corresponds a specific group of oscillations. In particular, to the zero level of activity corresponds the type- - pc 4 group of oscillations with periods from 50 to 150 sec. [2]. The pc 4 - oscillations are observed at low, practically zero magnetic activity, and consequently they cannot be identified with corpuscular fluxes from active regions and flares. This, and also the presence in the given group of oscillations of entirely specific daily and seasonal course allows to make the assumption that pc 4 are consequence of the action upon the magnetosphere of the Earth of only the solar wind from unperturbed regions of the Sun.

It should be noted that pc 4-oscillations are observed practically on every day corresponding to a low planetary activity, and their amplitude varies from zero to a certain maximum value (of the order of hundredths of fractions of gamma for the vertical component).

Therefore, the variation of solar wind intensity with the phase of solar activity cycle may be detected by merely studying the seasonal course of the amplitude of pc 4, averaged precisely in the same way as was done in the work [1] relative to amplitudes of the H- component. A significant time interval, encompassing a very high activity (1957 - 1959) was investigated alongside with the activity drop (1960 - 1961) and the low solar activity of 1961 - 1964 according to the variations of the vertical and horizontal components of the geomagnetic field at st. Borok. During that period, pc 4 -oscillations were observed for 267 days with fairly low magnetic activity, that is, practically always when recurrent or sporadic disturbances were absent, and when only the corpuscular radiation from the unperturbed regions of the Sun acted upon the Earth's magnetosphere.

We plotted in Fig. 1 [next page] in ordinates the amplitudes of pc 4 in gammas, averaged at the beginning for all hours of the given day whenever pc 4 were observed, and then for the season by all the days for which $\Sigma K_p \leq 10$. As may be seen from the graph, the amplitude of pc 4 has a clearly marked seasonal course with a summer maximum and winter minimum , and the value of the wintertime as well as summertime extremes of amplitude does not practically change with the phase of the solar activity cycle.

The exact correspondence of the extremes on curve on Fig. 1 for summer and winter points to the absence of the influence of equinoctial maxima of

magnetic activity due to recurrent perturbations. This influence is manifest in "creeping" of amplitude maxima of the seasonal course for the oscillations of the pc 3-type group corresponding to recurrent disturbances; at the same time the mean amplitude of pc 3 drops in the cycle of solar activity from the maximum to the minimum epoch by about a factor of 2 [2]. The fact of constance of extremum position in the seasonal course of the pc 4 amplitude is further evidence in favor of the fact that pc 4 correspond precisely to the solar wind originating in the unperturbed regions of the Sun.

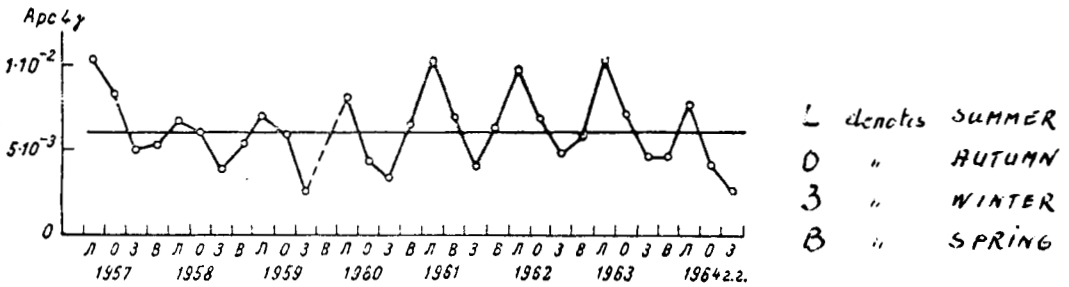

Fig. 1. - Seasonal course of the amplitude of pc 4 in a cycle of solar activity at the st. Borok in 1957 - 1964. The ordinates represent the amplitude of the vertical component of pc 4 in gammas.

Therefore, in magnetoquiet days ($Kp \approx 0$) the solar wind does not modify its intensity even according to data of short-period oscillations of the Earth's, as a function of the phase of the solar activity cycle; it constitutes the corpuscular radiation from unperturbed regions of the Sun.

*** THE END ***

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